Vol. 4 July 1940 No. 3

The EXTENSION ENTOMOLOGIST

"There has been no other period in the history of American agriculture when broad changes in theory and practice have been so extensive and rapid as in the past few years. This period has seen the first attempt at the formulation of a broad, coordinated agricultural program, which includes the various phases of agriculture considered from the standpoint of the reactions of the component parts on the whole.

"Extensive changes in agricultural practice are being made because of a greater appreciation of the importance of preventing soil erosion and maintaining soil fertility, of the necessity for wildlife conservation, of the need for reasonable adjustment of agricultural supply to demand, and of the value of proper land use.

"Insect control is one of the important factors which must be considered in such a broad program.

"Irrespective of personal opinions as to the wisdom of the broad policies of agricultural readjustment and as to their present and probable future results, the responsibility devolves upon all entomological workers to consider the effects of these changes on entomological practice and how they relate to and are correlated with other features of the whole program."

--Introduction to a paper by Dr. P. N Annand, assistant chief, Bur. Ent. and Plant Quar. Read before Sec. of Ext., Amer. Assoc. Econ. Ent., Columbus, Ohio, December 27, 1939. Published in its entirety in Jour. Econ. Ent., June 1940.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE AND
EXTENSION SERVICE, COOPERATING

CONTENTS

UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D. C.

THE EXTENSION ENTOMOLOGIST

Issued by the Extension Service and the Bureau of Entomology and Plant Quarantine cooperating with other Federal and State agencies in the furtherance of extension work in entomology.

M. P. Jones
Senior Extension Entomologist

ANNOUNCEMENT OF MEETINGS

September 1940. International Great Plains Conference of Entomologists, Lethbridge, Alberta Canada.
(Meeting called off on account of the war situation.)

November 14, 1940. Eastern Branch, American Association of Economic Entomologists, Atlantic City, N. J.

November 22-23, 1940. Cumberland-Shenandoah Valley Fruit Conference, Martinsburg, W. Va.

December 27-31, 1940. American Association of Economic Entomologists, Philadelphia, Pa.

EXCERPTS FROM ANNUAL REPORTS

EVOLUTION OF EXTENSION ENTOMOLOGY

The following might be set down as the progress or evolution of extension entomology through each 5-year period during the past 25 years:

When	What	How
1914-18	Awaken interest in controlling emergency insect outbreaks. Stimulate food production.	Farm visits and demonstrations to a skeptical clientele.
1919-23	Stimulate food production. Answer service calls. Give general information on insects and their control.	Through farm-bureau meetings and field demonstrations such as proof of safe sowing date to prevent losses due to the Hessian fly.
1924-29	Prepare for a threatening calamity from bad insects entering the State.	European corn borer tours and exhibits. Emphasis placed on mechanical control.

When	What	How
1930-34	Stress economic production. Adjustment of insecticide expenditures and spray methods. Beginning of organized fruit-spray service.	Promoting the use of cheaper home-made sprays and emphasizing timeliness and thoroughness. Beginning of special interest schools.
1935-39	Organized spray service. Instructing a public which believes in scientific agriculture.	Through lectures and publications. Use of cooperating agencies such as farm groups, commercial agencies, radio, and press. More training of county agents and beginning of farm unit schools.

--Annual Report, Ohio Extension Entomologist, 1939.

COOPERATION WITH OTHER AGENCIES

Soil-conservation work was carried on in cooperation with the Soil Conservation Service project managers, Mr. Thorpe at Benton Harbor, and Mr. Behymer at Howell, through the State Coordinator, Mr. Sackrider, and directly. Some phases of grasshopper-control work were discussed and recommendations made to county committees in several of the grasshopper counties. In addition, recommendations were made to the State soil-conservation committee concerning matters in connection with grasshopper-control work.

Farm security administrators, both State and county, were advised at different times in connection with specific insect-control problems with which they were confronted in carrying on the work with their cooperators.

--Annual Report, Michigan Extension Entomologist, 1938.

ARMYWORMS

Commencing in early June, armyworm moths were caught almost daily in the codling-moth bait pans in the university orchard. On June 11, our first telephone call about armyworm damage came from Greene County, southwestern Ohio. During the next 2 weeks, the worms devoured new grass in wheat fields, destroyed barley in a number of places, seriously damaged corn for several rods joining barley or wheat, and fed commonly on timothy heads. By June 23 they were pupating in the ground, and by July 1 the larvae had disappeared from the fields. The greatest damage done was to barley and the new grass in wheat fields. Parts of 14 counties in central and western Ohio had been covered by the outbreak.

Procedure: A circular letter carrying directions about using poisoned bait for armyworms was sent to the county agents on June 11. This letter arrived in time to meet the many demands being made on the county agents.

Hasty surveys showed the outbreak to be localized in the heaviest infested area in northern Pickaway County. Here a public demonstration was held on the evening of June 18 with about 200 farmers in attendance. These men saw the bait mixed and applied. Several authentic reports were received of hogs being made sick by eating the live armyworms. Some hogs were killed by eating too many of them. Very few live worms remained on the treated area after 24 hours, though the ground was covered with dead worms. Frequent rains later revived the grass and clover in the infested wheat fields. Very little actual loss occurred, except to barley and a few hogs, which were killed by eating too many armyworms. During July heavy flights of moths clustered in cherry trees attracted by the ripening fruit. Here they caused some damage to the ripe cherries.

--Annual Report, Ohio Extension
Entomologist, 1937.

LIVESTOCK PEST CONTROL
(Horse bots and botflies)

Ever since this subproject was started in 1936, horse-bot control has proved to be one of the most popular phases of extension entomology. The carbon disulphide capsule method of horse-bot eradication has been used exclusively and has been practically 100 percent effective. Very few animals have been lost from the effects of this treatment, and nearly all losses have occurred where the treatment was administered by a layman. Throughout the program, an effort has been made to have all treatments given by a qualified veterinarian.

Approximately 10,000 head of horses and mules in 15 counties were treated in 1936. This increased in 1937 to 41,777 head in 63 counties. In 1938, 39,498 head were treated in 65 counties. The precarious financial situation of many farmers and the greatly reduced number of horses and mules in the State caused a considerable reduction in 1939, but despite these drawbacks, 55 counties carried on the work, and 30,877 horses and mules belonging to 4,822 farmers were treated without the loss of a single animal. This number slightly exceeded the goal, which had been set at 30,000 head. The average cost of treatment was 36 cents a head, and many farmers stated that the results were worth at least $5 a head.

A circular on organizing and conducting a horse-bot-control campaign was prepared in 1936, and one on horse-bot control was prepared for general distribution during the same year. These were used throughout the campaigns of 1936, 1937, 1938, and 1939. The work was carried on in cooperation with the extension specialists in animal husbandry and animal pathology, and credit for the greater part of this work must be given to W. W. Derrick, animal husbandry specialist.

Counties in which interest was general were organized into precincts or neighborhoods, with a committee of farmers to promote the work in each. Meetings were held at centrally located points, and contact was made with all farmers to secure general cooperation. The county agricultural agent supervised the campaign, but every effort was made to have all treatments given by cooperating veterinarians. Materials were furnished by the veterinarians or were bought cooperatively at a reduced rate. Definite schedules were followed in administering the treatments, and each farmer had his horses and mules ready for treatment at a specified time and place. Where interest was not general in a county, the work was confined to the localities where interest was sufficient to justify the work.

Lincoln County led the State, with approximately 6,000 head treated, while Nance County was second with 3,150. Each of six other counties reported between 1,000 and 2,000 head having been treated. Interest in the work is good, and it is planned to carry on the work in 1940, although probably on a reduced scale because of the difficult financial situation and the reduced population of horses and mules.

--Annual Report, Nebraska Extension Entomologist, 1939.

MOSQUITOES

One club chose as the subject for its community project "Eradication of Mosquitoes" in its community. The community had become so infested that there was little peace day or night. The club chairman obtained the services of a health officer from the State department who came to the community to see what could be done. After thorough inspection, he reported that the breeding places were a refuse place where spoiled apples were dumped from an apple-storage plant, tin-can dumps around several homes in the community, rain barrels, and lily ponds. The committee interviewed the apple-storage plant and requested that they use lime on their refuse pile, or haul it away; the tin cans were hauled away in trucks; owners of open rain barrels were asked to cover them; and the owners of lily ponds obtained more fish and frogs to destroy the insects. Results were most gratifying, and people in the community were delighted to be rid almost entirely of their pests.

--Annual Report, Virginia Home Demonstration Agent, Nelson County, 1937.

PEA-WEEVIL CONTROL

During the winter of 1938-39, the extension entomologists of the University of Idaho and of Washington State College organized a program of pea-weevil control for the Palouse area for 1939. The program was based on findings of the pea-weevil control laboratory of the United States Department of Agriculture, Bureau of Entomology and Plant Quarantine, at Moscow. This laboratory is under the direction of T. A. Brindley. Mr.

Brindley also assisted greatly in the organization of the control program for 1939.

Farmer-grower dealer meetings were held under the auspices of the two schools in the Palouse areas in which the methods of control being used in the area of Walla Walla, Wash., were discussed. Farmers were advised to dust for pea weevil with rotenone dust containing 1 to .75 percent of rotenone.

During the spring, 28 power dusters were built in the Palouse area, and approximately 5,000 acres of peas grown for seed and for freezing were dusted for pea weevil. One hundred thousand pounds of dust were used.

Results indicate that wherever the proper methods were followed, very excellent control was obtained and the peas were marketed at a great saving to the grower in peas free from weevil damage. In areas where as high as 90 percent of the peas were damaged by weevil in the previous season, little damage was done to dusted crops, but adjacent crops which were not dusted were severely damaged again this year. There were more weevils in the areas this year than in any other year since peas have been grown.

--Annual Report, Idaho Entomologist,
1939.

INSECTICIDE CONFERENCES

More than 150 dealers from all sections of Indiana attended five meetings. These conferences are for the purpose of bringing about closer cooperation between dealers and extension workers. We believe that through this medium, large numbers of people can be reached. One dealer made the statement that he sold insecticides to more than 500 people.

As a result of this phase of the project, insecticide dealers in more than 60 counties now handle materials recommended by Purdue University. For example, one organization having 62 retail stores throughout the State is now cooperating with us 100 percent. This cooperation has largely solved the problem of the availability of insecticides in these counties. The same organization is sponsoring a campaign to increase the sale of dusters.

We also have been conducting a campaign to promote the use of this type of equipment, and as a result one company manufacturing dusters in Indiana has increased its sales 100 percent in the past year.

--Annual Report, Indiana Entomologist,
1939.

OUTLOOK FOR 1940

Crop losses in Alabama in 1939 were severe. It is felt by those of us who have made a rather careful study of the losses caused during the year by the boll weevil, velvetbean caterpillar, corn earworm, Mexican bean beetle, and other insect pests that the total preventable loss from these insects would amount to more than ten million dollars.

Farmers of the State are seriously concerned about these problems. Requests are already coming in from the field for experiment station information on the control of boll weevil and other pests.

In planning the work for 1940, plans were made for every county in the State to carry an extensive insect-control program. Much more time will be required of the leader of this project for preparing information, and in organizing an educational program if satisfactory results are to be obtained in this work.

--Annual Report, Alabama Entomologist, 1939.

BUILDING THE YARDSTICK FOR EXTENSION WORK *

by C. B. Dibble, Extension Specialist in Insect Control, Michigan.

To make the intentions of this paper clear, a definition of the term "yardstick" seems in order. The common variety of yardstick is an instrument used for making measurements and is 3 feet long. It is usually divided into marked and numbered inches and fractions thereof and is used by paperhangers and others for making relatively accurate measurements of objects having definite limits. To apply this instrument as defined to the subject nearest at hand, an extension worker, we arrive at a vertical measurement of 5 feet, 11½ inches. As the tool does not lend itself well to the accurate measurement of the other dimensions of the subject, our job is finished unless we can find other tools which, for convenience or want of a better name, we may call yardsticks.

No doubt we should first determine what we want to measure. In addition to the old standards of weight and distance, another term is frequently used that concerns a supposedly measurable quality. This term is "efficiency". It applies to endeavors and is interpreted in degrees of effectiveness. Perhaps we can find for this a tool which will permit us to extend the job at hand beyond the realm covered by the three dimensions of the paperhangers' tool.

Increased human happiness is probably the real measure of successful extension work. Farm people are able to realize more joy in living

* An essay in the contest of Epsilon Sigma Phi.

through a changed outlook, a broader understanding, or through the benefit of the experiences of others in meeting troublesome problems. The justification for the time, money, and effort expended in agricultural extension work lies in the reactions of the human minds influenced by contact with the endeavors of extension workers to disseminate useful information among rural people. The acquisition of these experiences is a learning process and results in an advancement of the receptive individual's education. This should develop an ability to assimilate experiences, name their component parts, and use these to assimilate more completely the new experiences.

Scientific knowledge, usually acquired through academic training, alone can provide the media for true conceptions of natural phenomena. Such conceptions change as scientific knowledge advances. The conceptions provoked by the advanced knowledge of others will appear perverted or untrue to the partly informed teacher or student. Few people need academic degrees, but many if not all of us enjoy the feeling of superiority that is the natural result of a full understanding of definite situations, circumstances, or the surroundings in which we live and work.

Extension workers do not make people wise, for as it has been said, wisdom is probably born in a man, but it is developed only by the acquisition of knowledge through learning processes. The principal attribute of wisdom, or good judgment, is the process of thinking, which is the remembering of experiences combined with the imagining of them under new circumstances. Good judgment is the art of developing true conceptions and is enhanced by broad experiences. Lack of experience, poor memory, and lack of or misdirected imagination may result in the so-called bad judgment which contributes greatly to human unhappiness.

The principal contribution of extension workers is the exposing of ideas to rural people in a way which permits the grasping of such ideas as experiences in the minds of these people in bringing the experiences of others from the experiment station or from farm or home practice. The extension worker also has the opportunity to screen out some of the "chaff" and deliver a high percentage of useful product. College training or other previous experience should enable the extension teacher to exercise the traits of wisdom and good judgment which are the aims of constructive teaching effort. As teachers they promote learning by providing names for things and rules of procedure. This results in turn in providing the experience of new things to find names for and new procedures for which to formulate rules.

An acquaintance in earlier days was Pete, who worked on the railroad. Pete, the section hand, had a name for everything he saw. Of course, there were many things that Pete did not consciously see and many different things were easily classified for his purposes under the same name. Pete was not sensitive to physical discomforts and was not a particularly unhappy person. He was fully satisfied with his attainments, but not always contented with his lot. He temporarily enjoyed a raise in wages and resented any decreases in his

periodic cash receipts like the rest of us. Pete did not read much, if at all, and had no opportunity to acquire the benefit of the experiences of others except in the very narrow fields encompassed by the heat of the store stove on a winter's evening. In fact, he felt no need for the further pursuit of learning.

Many farm people are like Pete. Their real wants are simple and nearly satisfied. They are not prompted into further activity either mental or physical by their desires for things which for them might be classified as luxuries. If they are fully contented with the state of affairs in which they find themselves, they have already reached a goal seldom gained by human beings. If they are not contented, they are deserving of a chance to learn how to change their circumstances, provided they are willing to contribute the necessary effort.

A worker becomes happily engaged in a task only when a full understanding of the various phenomena involved is sought in addition to the desire to finish the endeavor. Poor workmanship is probably often caused by a lack of interest in the job at hand. Unhappiness in work may be the result of a lack of understanding of the fundamentals of the job. Work ceases to be drudgery only when the worker reaches a mental state of creativeness and the resulting urge to exercise this godly power. An expressed sincere appreciatio n of the usefulness or unusual nature of the contribution often serves as an incentive to such a state of mind.

The housewife who keeps a tidy house or bakes unusually good cakes strives for greater perfection and performs more frequent repetition of the tasks involved without a sense of impressed work. Fatigue becomes a blessing because of the greater enjoyment of rest with mental reflections on a superior creative ability appreciated by family and friends.

These things, as the results of teaching, can be measured only by the outward reflections of a changed mental state. An increased interest in living with the rest of the people in the world could be construed as an indication of such attainments. Clean school children reflect such a reaction in communities; tidy houses for the housewife, and clean fields with well-cared-for livestock for the farmer are the outward reflections of a desire for the approval of friends and neighbors. The profit motive alone is not a sufficient inducement to encourage most people to use lime or fertilizer, to buy a new curry comb and use it, to wash the living-room curtains in the fall as well as in the spring, or to plant and care for grass and shrubs around their homes.

Pride, the consciousness of living with other people and desiring their approval, provides mankind with excuses for continuing to live. The extension worker has an opportunity to help rural people develop and attain new desires by bringing the experiences of others to new altars. The broadened outlook or idea may appeal to new "customers" and arouse within them desires for new attainments. This may result in mental

activity and possibly physical expression. These in turn will give the individual a feeling or sense of importance in relation to others in the home or in the community in which they find themselves.

Without new goals, existence becomes a drab affair. Once attained, a goal loses its usefulness and, to enjoy living, new fields must be found for exploitation. The person without attainable but unattained goals should probably visit the undertaker before a bad odor interferes with the efforts of others who search for happiness.

People most often seem to enjoy happiness as the result of having the privilege of striving for the things that seem worth while. Once achieved, the ends attained can continue to function as sources of delight only in a retrospective manner or as stepping stones to new attainments.

A new broom may bring sufficient incentive to cause a housewife to hum more energetically than usual at her sweeping for several days. It takes a part of the egg money for several weeks to make possible the acquisition of a new broom. The exhilaration exhibited by the musical expressions is probably due to the prospect of attaining new heights in housekeeping as well as to the acquisitive and possessive satisfactions.

The extension worker, as a teacher, presents the opportunity and opens the door to subjects that are of interest to rural people and that will influence their mental or physical comforts. The person endowed with understanding, patience, and tolerance without reservations probably does not need to be quick of wit or blessed with all the wisdom of the sages to contribute, by suggestion and example, to the solution of many human problems in rural communities. Profits and increased production do not always measure the value of teaching efforts and may serve to mislead the statistically minded as to the real value of this kind of public service work. Teaching value and teacher value probably can be measured only by the reactions in the minds of the people taught.

Human happiness originates only within each individual. It is enhanced by the individual's efforts to make the most of whatever there is at hand to work with in a spirit of thankfulness that there is so much. A new way to cook turnips, the development of a local marl bed, the control of grasshoppers with poisoned sawdust bait, and hundreds of other similar useful ideas are the extension worker's stock in trade for creating more rural contentment. A knowledge of many of these subject-matter experiences with their uses and limitations permits the keeping of a big store to serve many people.

The actual service rendered depends on the exposition and acceptance of this merchandise. Lectures, demonstrations, exhibits, movies, radio, news stories, letters, and cards are teaching tools. The successful use of these tools depends upon the extension workman's knowledge of subject matter and degree of understanding of human needs and behavior.

A yardstick for measuring the efficiency of extension workers would, therefore, need to be a flexible instrument. If the archaeologists of a later day find such an instrument in the debris of the present, on one side no doubt will be the legend "Ability to visualize true rural problems" and on the reverse "Ability to recognize and teach simple, useful ideas."

TIMELY TOPICS

THE ELEVENTH COMMANDMENT

The Eleventh Commandment, according to Dr. Walter Lowdermilk, Chief of Research of the Soil Conservation Service, "should read somewhat as follows --'Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by thy herds, so that thy descendants may have abundance forever. If any shall fail in this stewardship of the land, thy fruitful fields shall become sterile stony ground and wasting gullies, and thy descendants shall decrease and live in poverty, or be destroyed from off the face of the earth.'"

HAVE A MUSEUM

We have made a museum an important activity of our club. It is composed mostly of the children's insect collections, bird nests, and things made from nature materials picked up in the woods. Ten of the 13 members majored in the study of insects, and some mounted about 400 insects of 80 different kinds.

We followed 4-H directions for making nets, spreading-boards, poison bottles, and boxes to hold the collections, and made them all at club meetings in my family's workshop. We have these on display in the museum, and also caterpillars in formaldehyde, insect homes which include a huge hornet nest and one broken open to show the inside, homes of paper wasps, mud wasps, cells made by honeybees, cocoons, the interesting little home of the caddis fly larvae, made of tiny pebbles cemented together, oystershell scale on lilacs, and various kinds of galls, all insect homes.

Some of the bird nests we found while birds were still in them, so we watched the birds develop, and collected the nest in the fall. The other nests were brought in by the children.

From nature materials butternut buttons and other wooden buttons, and pins were made. Some buttons are made of wood engraved by the engraver beetles. We have almost a complete "nature alphabet," and a novel whisk made by peeling back the fibers of a witch-hazel branch. We got the idea from the conservation truck when it was here.

--Mabel Riddle, North Wilbraham, Mass.

RADIO -- WHO LISTENS TO WHAT PROGRAM?

Director J. W. Bateman of Louisiana took time off a few months ago to go deer hunting. He was alone in his car and had long since left the

paved roads behind; the gravelled surfaces were becoming more sparse. He was in the backwoods country. There was a heavy fog at 7 o'clock that morning, and the Director stopped at a small farmhouse to inquire the way to the hunting camp. From now on, let's hear from the Director:

"I knocked on the flimsy door and was invited inside to get warm. There were four men seated around a battery-type radio and they weren't listening to a hill-billy program either. They were tuned in on 'Dixie's Early Edition' and I heard one of our specialists carrying on a spirited discussion with Woodrow Hattic, the director of WWL's farm program, on the 1940 outlook for farm crops and livestock. Frankly, this surprised me. My interest in radio had been lukewarm because I had always felt that we didn't reach the 'folks at the forks of the creek.' I found my last argument against the radio completely disproved."

VALUE OF SUBJECT-MATTER BULLETINS TO 4-H CLUB LEADERS

Subject matter instruction bulletins were reported as "most helpful" by 58 percent and "helpful" by 39 percent of the leaders of girls' clubs; 19 percent of the leaders of boys' clubs found the subject-matter bulletins "most helpful" and 69 percent "helpful."

—From A study of 4-H local leadership in South Carolina, Ext. Serv. Cir. 325, March 1940.

THREE GENERATIONS OF EUROPEAN CORN BORER OBSERVED IN SOUTHERN NEW JERSEY

C. A. Clark, associate entomologist in charge, Moorestown, N. J., says it has been established definitely that the European corn borer can produce at least a partial third generation annually in southern New Jersey. This information was obtained from frequent and extensive field observations, supplemented by plot studies at the Moorestown laboratory in 1938. The oviposition period of the second generation in New Jersey this year extended from July 25 to August 20, with the peak of egg deposition occurring during the last 3 days in July. Pupation of the second generation reached 12 percent in some fields by August 23. Moth emergence had started, and fresh eggs of the third generation were also found on that date.

INSECTICIDE EXPERIMENTS FOR CONTROL OF EUROPEAN CORN BORER

On conclusion of his 1938 experiments for insecticidal control of the European corn borer in sweet corn in the Lake States, D. D. Questel, Toledo, Ohio, reports that ground derris (4 lbs. per 100 gals. water) was the outstanding spray used. With this spray, 97.8 percent of the No. 1 ears in the treated plots were borer-free, as compared with 68.4 percent in the nontreated plots, and the borer population in the treated plots was reduced 89.3 percent from that in the nontreated plots. Sprays and dusts of two fluorine compounds and phenothiazine spray, also gave good control and were about equal in their effectiveness. The fluorine compounds, however, caused severe burning of the corn plants. Both standard nicotine tannate (.0625 percent nicotine) and Quebracho nicotine tannate (.0625 percent nicotine) sprays were low in insecticidal performance in the Ohio tests.

EIGHT SPECIES OF AEGILOPS AS NEW HOSTS OF HESSIAN FLY

According to Elmer T. Jones, assistant entomologist, Manhattan, nine species of Aegilops of hitherto unknown reaction to hessian-fly development have been tested as possible fly hosts. In these tests appreciable infestations of puparia have been found to develop on Aegilops comosa, A. speltoides, A. ligustica, A. umbellulata, A. aucheri, A. variabilis, and A. sharonensis. Species are given in ascending order of infestation. Percentage of plants infested ranged from 30 percent for A. comosa to 80 percent for A. sharonensis. One species, A. caudata, was found to be entirely resistant to infestation.

CONTROL OF SHORT-NOSED OX LOUSE

O. G. Babcock, of the Sonora, Tex., laboratory, Bureau of Entomology and Plant Quarantine, has been working on the control of Haematopinus eurysternus Nitz., a cattle pest which has shown considerable resistance to the standard insecticides. Concerning tests with a mixture of cube, sulfur, and water used as a dip, Mr. Babcock writes as follows:

"During the past year a sufficient number of cattle were dipped in the cube (containing 5 percent rotenone)-sulfur dip to show that this dip is practical and will kill all lice present, but not the eggs.

More work is needed to determine the value of extracts of derris, as well as of cube, as compared to powdered cube in combination with sulfur. It has also been shown that a 14-day interval between dippings for

the short-nosed cattle louse is not practical, as not all the eggs will hatch in that time. A 17-day interval, and no less, is absolutely essential."

INSECTS VIA AIRPLANES

The American Journal of Public Health (August) contains an editorial on the introduction, through airplanes, of insects affecting man. In Miami, for example, "the inspection is made primarily for the detection of living mosquitoes, particularly Aedes aegypti. During 1938, 398 airplanes were inspected at the airport. Of these, 187 harbored many dead and some live insects. Of 651 insects recovered, 166 were alive. There were 45 mosquitoes on the planes, - 40 dead and 5 alive. Of the 5 living mosquitoes, none belonged to disease-carrying species. Among the dead there was one Anopheles albimanus, which is one of the 26 listed by Covell as being the chief malaria-carrying Anopheles of the world. Anopheles albimanus is found in Mexico, in Central America, and in South America, so that the indications are that it came from one of those countries, though it did not survive the trip. House flies, midges, gnats, and other small flies, beetles, wasps, ants, moths, cockroaches, chinch bugs, as well as two spiders were found during the year. One-half hour before landing, planes from the south are sprayed with a standardized pyrethrum extract, 2 grams of pyrethrin per 100 cc., plus 4 parts of a highly refined mineral oil. After disembarkment of the passengers and crew, thorough spraying is done and the plane closed for the night...."

FUMIGATION OF PROP POLES FOR KILLING HIBERNATING CODLING MOTH

Following up a complaint by a local grower that codling-moth injury in past years appeared to be most severe around stacks of poles used the previous season for bracing limbs of apple trees, D. W. Hamilton, of the Poughkeepsie, N. Y., laboratory, Bureau of Entomology and Plant Quarantine, made a study of the problem.

Because of excessive labor costs, the grower deemed it inadvisable to remove these poles from the orchard, and fumigation experiments were conducted on 2 stacks, each consisting of approximately 1,000 poles cut from saplings or young trees, many containing rough bark. These were stacked in wigwam fashion. Each pile was about 10 feet wide at the base and 20 feet high, and contained almost 1,000 cubic feet of space. To retain the fumigant, heavy tarpaulins were placed over the poles and held in place by ropes.

To check results more readily, five cheesecloth bags containing codling-moth pupae were tacked throughout each stack at various distances from the ground. Hydrocyanic acid gas was used as the fumigant. In one

stack of poles this gas was generated by placing 1 pound of sodium cyanide eggs in sulfuric acid in two battery jars on opposite sides of the base of the stack. In the other stack, 2 pounds of calcium cyanide was placed on the ground under the poles. The fumigants were placed at the base of the stacks about 4 p. m. on a still day and the tarpaulins left in place until 8 a. m. the following day. In the stack in which sodium cyanide was used as the source of the gas, the mortality was 100 percent, whereas there was 42 percent survival in the stack treated with calcium cyanide.

CITRUS PEST CONTROL

California Cultivator (July 30) says editorially: "Dr. A. M. Boyce of the citrus experiment station has been working for the past 2 or 3 years with a number of new dusts, one of which bears the name of dinitro-ortho-cyclo-hexylphenol, but is more frequently called dinitro dust. This gives promise of being effective in several ways, particularly against red spider on citrus. Since it does not fume, it is necessary to hit the bugs in order to kill them, and complete coverage is an essential problem. Up until recently it was believed that, because of the heavy foliage on citrus trees, it would not be possible to treat them with dusts.

The agricultural engineering department of the University of California designed an entirely new type of duster that seems to be satisfactory. Former machines supplied a small volume of air at high velocities, 150 to 200 miles per hour. The newer type uses ventilating fans for the blowers and supplies a large volume of air, 18,000 to 20,000 cubic feet per minute, which travels at 60 to 80 miles per hour and floats the dust all through the trees.... About 20 of these machines have been constructed and are in use in southern California. These machines are very good for applying cryolite for control of orange worms in addition to other pests."

GOOD COLOR IN APPLES

R. B. Dustman and I. J. Duncan, of the West Virginia Experiment Station, in an article, "Effect of Certain Thiocyanate Sprays on Foliage and Fruit in Apples," appearing in Plant Physiology (April) summarize studies at the station as follows: "It has been found that soluble thiocyanates, particularly inorganic thiocyanates, used as a spray on apples during the growing season, exert a pronounced physiological effect on both foliage and fruit as follows: In the foliage the leaves are subjected to spray burn and to a chlorotic condition arising from the effect of the chemical on the green coloring matter of the plant. In the fruit the amount of red color occurring normally tends to be increased, and the green ground-color tends to be reduced or replaced by varying shades of yellow and yellow green."

COLCHICINE RESEARCH

Profound sex changes in plants can be made by means of colchicine, it was reported recently to the American Philosophical Society by H. E. Warmke and A..F. Blakeslee of the Carnegie Institution of Washington. The plant used by the two researchers was Melandrium dioicum. In nature, this plant bears male and female flowers on separate plants, instead of having male and female (pollen and seed-producing) parts in the same flowers. Sex in Melandrium is linked with two particular chromosomes, known as X and Y. A plant with the combination XX is a female, or seed-bearing. By treatment with colchicine, new strains of Melandrium, with double the usual chromosome numbers, have been produced. Sex chromosome combinations are thus possible in the combinations XXXX, XXYY and XXXY. XXXX plants are wholly female, XXYY plants wholly male. XXXY plants are male but have a touch of female about them, being able to produce a few seeds when self-fertilized. From seeds produced by this self-fertilization, new plants have been produced that have two-sexed flowers like those found in the majority of familiar forms, able both to produce pollen and to bear seed. (Science Service.)

WIREWORM INJURY TO POTATO SEED PIECES REDUCED BY APPLYING SAWDUST TREATED WITH DICHLOROETHYL ETHER

M. W. Stone, of the Ventura, Calif., laboratory, Bureau of Entomology and Plant Quarantine, reports that in a preliminary experiment performed in 1939, injury to potato seed pieces by wireworms, principally the sugar-beet wireworm (Limonius californicus Mann.), was reduced markedly by a sub-surface application of sawdust treated with dichloroethyl ether mixed with the fertilizer and drilled in with the seed pieces. The drill was set so that the mixture was placed at a distance of about 2 inches on either side of the seed pieces and at a depth of 4 inches, corresponding with the planting depth of the potatoes.

An examination of the seed pieces on the 7th, 11th, 14th, and 17th day after planting disclosed that of 90 seed pieces examined, only 4 wireworm larvae were found in the rows treated with the dichloroethyl ether mixture, as compared with 99 larvae in 90 seed pieces taken from untreated rows grown under comparable conditions.

In a series of soil samples, it was found that on an average there were 0.93 living wireworm larva per $\frac{1}{2}$ square foot in the treated row, as compared with an average of 4.4 wireworms in the same unit area of the untreated rows. As no dead larvae were found in the seed pieces from the untreated row, it was apparent from the general results obtained in this experiment that the designated mixture containing dichloroethyl ether was effective in either repelling or killing wireworms attacking potato seed pieces.

LIME-SULFUR SPRAYS AND BENTONITE-SULFUR DUST MIXTURES EFFECTIVE AGAINST RED BERRY MITE

B. J. Landis and W. W. Baker, of the Puyallup, Wash., laboratory, report that an analysis of the results obtained in experiments in 1939 demonstrated that a satisfactory control of Eriophyes essigi Hassan could be achieved in fields that had not been sprayed for the control of this mite during the previous year, by making either two applications of lime-sulfur (6-100) spray, or bentonite-sulfur dust mixture. The latter appears to be an excellent substitute for the lime-sulfur against the mite. The addition of a sticker to lime-sulfur appeared to increase slightly the degree of control obtained.

Experiments in adding various materials, particularly manganese sulfate, aluminum sulfate, iron sulfate, and magnesium sulfate, to lime-sulfur sprays just prior to blooming, in an attempt to overcome the shock caused by sulfur on brambles indicated that (1) the leaves produced on blackberries where iron sulfate was applied were of a darker green than leaves on plots where this material had not been applied or from other plots where the other listed materials were applied; (2) aluminum sulfate appeared to damage the developing flowers and fruit; and (3) a greater number of mite-infested berries were found in plots where these materials were applied than in plots where they were not applied.

In general, none of the materials corrected the slight yellowing of the foliage ordinarily attributed to the application of lime-sulfur for red-berry-mite control. It was found that the application of various oil sprays were less effective than lime-sulfur sprays in protecting the plants from the red berry mite throughout the season in instances where a single application was made to plants at the time the cane buds were opening.

DENNIS PATENT ON CUBE ADJUDICATED

In 1938 the American Cube Syndicate brought suit against L. E. Pitner and partners doing business as the Agicide Laboratories, Milwaukee, Wis., alleging infringement of United States Reissue Patent No. 18,667. This patent covers the use as an insecticide and vermifuge of ground cube root with the fibrous element removed. The reissue patent corrected information concerning the botanical origin of cube which was given in the original patent.

The suit was heard in the United States District Court for the eastern district of Wisconsin at Milwaukee. N. E. McIndoo, R. C. Roark, and John E. Dudley, Jr., of the Bureau of Entomology and Plant Quarantine, appeared as witnesses to testify concerning the chemical and botanical relationships of cube (Lonchocarpus), derris, and tephrosia, the early

use of cube as an insecticide, and its present large-scale use, especially against the pea aphid. The judge ruled in favor of the American Cube Syndicate.

An appeal was taken which was heard in the United States Circuit Court of Appeals for the Seventh Circuit in Chicago, Ill. The Circuit Court overruled the decision and decided that the Dennis patent was void for lack of originality on the part of the patentee and for lack of invention over the art.

The American Cube Syndicate petitioned the United States Supreme Court for a writ of certiorari in this patent action, but on November 7, 1939, the Supreme Court refused to review the case. Thus the final word has been said in this case.

The final adjudication of this patent is of considerable interest to entomologists, inasmuch as about 2,500,000 pounds of cube are imported annually for use in the preparation of insecticidal dusts and sprays. The American Cube Syndicate, owners of the patents, had been demanding a royalty of 1 cent a pound for the use of cube as an insecticide, and in 1939 had increased the price to 1½ cents. The invalidation of the patent saves the public at least $25,000 a year.

KENYA PYRETHRUM

E. Talbot Smith, the American consul at Nairobi, Colony of Kenya, East Africa, in July 1939 completed a report on the pyrethrum industry in that country which is of interest to all working with this important insecticide.

Pyrethrum was first planted in Kenya in 1928 as an experiment. It was not until 1936 that the exports of pyrethrum were considered important enough to warrant a separate classification in the Colony's export statistics. Of the 1,980 tons of pyrethrum flowers, valued at $842,400, exported from Kenya during the 12 months ended March 31, 1939, the United States took 1,648 tons. The industry has grown rapidly, and it was expected that, by the end of 1939, 12,519 acres would be under pyrethrum in Kenya. Where the soil is well drained, pyrethrum is now grown at altitudes from 6,500 to 9,000 feet above sea level.

Mr. Smith's report gives details as to seeding, spacing, fertilizing, picking, cost of production, drying, grading, baling, analysis, and marketing. The yield per acre ranges from 300 to 1,100 pounds of dried flowers per annum. These variations in yield are caused by differences in fertility of the soil, variations in rainfall, and other factors, the most important of which is the altitude at which grown. The higher the altitude the greater the yield.

Insecticide manufacturers in the United States prefer Kenya pyrethrum flowers to those from Japan or Dalmatia because of their high pyrethrin content. Only pyrethrum having a pyrethrin content of 1.4 percent or over is exported from Kenya. The export of pyrethrum from Kenya is a monopoly controlled by the Kenya Farmers' A ssociation.

NEW PARTICLE-SIZE SURVEY OF SULFURS IN PROGRESS

A survey of average particle-diameters of powdered sulfurs produced commercially for insecticidal use is being made by E. L. Goodon, Division of Insecticide Investigations. In this survey is employed a new apparatus designed to indicate directly the surface-weighted average diameter of any sample, rather than its size distribution. This agerage diameter, being inversely proportional to specific surface, is one of the best indices to those properties of a powder which depend on fineness, and thus constitutes one of the simplest and most logical bases for comparison of samples with regard to particle size.

Results accumulated to date (involving 35 samples) in the current survey of sulfur show averages distributed almost continuously throughout the range from 5 to 28 microns. Incidentally, the surface-weighted average diameter, when expressed as here in microns, may be thought of (with certain theoretical provisions) as numerically equal to the actual volume in cubic centimeters of material required to cover a square meter of surface.

EXTRA REVENUE FROM METHYL BROMIDE FUMIGATION CHAMBERS

A grower in central Pennsylvania, who has built an approved fumigation chamber, is helping to pay for its construction by fumigating rugs, furniture, and other household articles for moths, and expects to build up an extensive side line in fumigation. Customers must bring and take away all articles fumigated, as the grower does not want to upset his regular greenhouse routine.

A report from the district inspector in Ohio stated that a number of greenhousemen whose premises are uninfested with the Japanese beetle, and who are not obliged to fumigate or chemically treat their plants as a requirement for certification, are nevertheless planning to build fumigation chambers. These will be used exclusively for the control of general greenhouse pests wholly apart from any quarantine requirements.

NEW SPRAY RESIDUE TOLERANCE ANNOUNCED

The following release from the Federal Security Administration, Washington, calls attention to the new tolerance for lead and arsenic residue on pears and apples.

"August 10, 1940

"TO GROWERS AND SHIPPERS OF APPLES AND PEARS:

"Effective immediately, spray residue tolerances for apples and pears shipped within the jurisdiction of the Federal Food, Drug, and Cosmetic Act are set at 0.05 grain of lead per pound and 0.025 grain of arsenic (as arsenic trioxide) per pound.

"These new tolerances revise the order of the Secretary of Agriculture of September 1938, based upon a progress report of the Public Health Service submitted at that time, placing the limit for lead at 0.025 grain per pound. The new tolerances are based on the results of a three year study made by the United States Public Health Service at the direction of the Congress and reflect the scientific character of the conclusions reached by that Service.

"The Public Health Service did not include fluorine sprays within the scope of its investigation and the tolerance for fluorine will therefore, for the present, remain at 0.02 grain of fluorine per pound as set by the Secretary of Agriculture in an announcement of November 14, 1938. The new tolerances for lead and arsenic, in accordance with the recommendation of the Public Health Service, are specifically restricted to lead arsenate residues on apples and pears and are not extended to other food commodities.

"The Public Health Service was asked, (1) what, in the light of its investigations, it considers safe tolerances for lead and arsenic on apples and pears; (2) whether tolerances recommended for apples and pears are likewise applicable to other food commodities. In answer to these inquiries the Acting Surgeon General said, in part:

> 'On July 9, 1940, the final report of an intensive study of 1,231 men, women and children and a report of supplementary laboratory studies was forwarded to you and to the Commissioner of the Food and Drug Administration. The subjects of the field study lived in a district where large quantities of lead arsenate are used, and have been used for over 30 years, as an insecticide on apples and pears. In the light of those investigations, it is the opinion of the Public Health Service that a tolerance of lead arsenate on apples and pears may be placed at 0.05 grains per pound for lead, and for arsenic (arsenic trioxide) at 0.025 grains per pound without endangering the health of the consumers. The Public Health Service would not feel justified in stating that tolerances higher than these might not endanger the health of the consumer.

'In answer to your second question, since the above mentioned investigations dealt only with lead and arsenic in the form of lead arsenate on apples and pears, these tolerances are not applicable to other food commodities.

'It should be understood that the Public Health Service has always regarded the contamination of foodstuffs as well as air and water by toxic materials as unhygienic and undesirable, and while the Public Health Service is cognizant of the great amount of research work which has been done on insect control, it is recommended that the Administrator urge the Secretary of Agriculture to continue studies in this field. It may be expected that if methods of evaluation of toxic effects in human beings are improved a redefinition of threshold values may be necessary.'"

Very truly yours,

/s/ Paul V. McNutt

Administrator

PUBLICATIONS

Alabama

Insect pests of azaleas and camellias and their control. L. L. English and G. F. Turnipseed. Ala. Agr. Expt. Sta. Cir. 84, 18 p., illus. Auburn. 1940.

Connecticut

Spray program for pear, cherry, plum, grape, raspberry, strawberry. H. A. Rollins. Univ. of Conn. Ext. Bul. 287, 8 p. Storrs. 1940

Home orchard and small fruits spray and dust program. H. A. Rollins. Univ. of Conn. Ext. Bul. 288, 12 p. Storrs. 1940.

Spray program for apple and peach, 1940. H. A. Rollins. Univ. of Conn. Ext. Bul. 289, 11 p., illus. Storrs. 1940.

Idaho

Idaho recommendations for insect control. W. E. Shull and R. A. Fisher. Idaho Agr. Col. Ext. Bul. 129, 75 p. Moscow. 1940

Mechanized dusting equipment for pea weevil control. E. N. Humphrey. Idaho Sta. Bul. 234, 11 p., illus. Moscow. 1940.

Pea weevil control. T. A. Brindley and W. E. Shull. Idaho Agr. Col. Ext. Bul. 132, 15p., illus. Moscow. 1940.

Kansas

Identification of the eggs of mid-western grasshoppers. J. B. Tuck and R. C. Smith. Kas. Sta. Tech. Bul. 48, 39 p., illus. Manhattan. 1939.

Kentucky

Wireworm injury to tobacco plants. H. H. Jewett. Ky. Agr. Expt. Sta. Bul. 398, 16 p., illus. Lexington. 1940.

Maine

Insect pest control in young orchards. F. H. Lathrop. Maine Agr. Col. Ext. Bul. 274, 19 p., illus. Orono. 1940.

Massachussetts

Apple spray schedule for the home orchard. Depts. of Pomology, Entomology, and Botany. Mass. State Col. Ext. Leaflet 100D, rev. 4 p., illus. Amherst. 1940.

Minnesota

Insects infesting home foods. Harold H. Shepard. Univ. of Minn. Agr. Ext. Bul. 210, 8 p., illus. St. Paul. 1940

Nebraska

Control of stored grain pests in Nebraska. M. H. Swenk and D. B. Whelan. Nebr. Agr. Expt. Sta. Cir. 62, 11 p., illus. Lincoln. 1940

New Jersey

Analysos of materials sold as insecticides and fungicides during 1939. C. S. Cathcart and R. L. Willis. N. J. Agr. Expt. Sta. Bul. 670, 16 p. New Brunswick. 1939.

The New Jersey tick problem. T. J. Headlee. N. J. Agr. Expt. Sta. Cir. 395, 12 p., illus. New Brunswick. 1940.

New Mexico

Dusting and spraying for the control of insect pests of the Irish potato. J. R. Eyer and J. V. Enzie. N. Mex. Agr. Expt. Sta. Bul. 266, 40 p., illus. State College. 1939.

New York

Dust and spray recommendations for Long Island, 1940. R. W. Leiby and F. M. Blodgett. Cornell (N.Y.) Ext. Bul. 435, 4 p., illus. Ithaca. 1940.

Handling package bees. George H. Rea. N. Y. Agr. Col. (Cornell) Ext. Bul. 433, 8 p., illus. Ithaca. 1940.

North Carolina

Boll weevil control. J. O. Rowell. N. C. State Col. Agr. Ext. Folder 45, 6 p., illus. Raleigh. 1940.

Ohio

The control of garden insects and diseases. T. H. Parks and S. C. Allison. Ohio State Univ. Agr. Ext. Bul. 76, 10th ed., rev., 56 p., illus. Columbus, 1940.

Spraying program and pest control for fruit crops. Depts. of Botany, Entomology, and Horticulture. Ohio State Univ. Agr. Ext. Bul. 128, 8th ed., 52 p., illus. Columbus. 1940.

Oklahoma

Orchard spray calendar. Okla. State Ext. Cir. 168 rev., 26 p., illus. Stillwater. 1940.

Pennsylvania

The rose leaf beetle in Pennsylvania. M. Wood. Pa. Agr. Expt. Sta. Bul. 387, 22 p., illus. State College. 1940.

Washington

Pea weevil control in Washington. F. G. Hinman and L. G. Smith. Wash. State Col. Ext. Bul. 254, 20 p., illus. Pullman. 1940.

United States Department of Agriculture

Insects and diseases of the pecan and their control. G. F. Moznette. U. S. Dept. Agr. Farmer's Bul. 1829F, 70 p., illus. 1940.

The peach borer--How to prevent or lessen its ravages. Oliver I. Snapp. U. S. Dept. Agr. Farmer's Bul. 1246F, rev., 14 p., illus. 1940.

The tobacco budworm and its control in the Georgia and Florida tobacco-growing region. A. C. Morgan and F. S. Chamberlin. U. S. Dept. Agr. Farmer's Bul. 1531F, rev., 10 p., illus. 1940.

Mealworms. R. T. Cotton. U. S. Dept. Agr.. Leaflet 195L, 5 p., Illus. 1940.

The sweetpotato weevil and how to control it. K. L. Cockerham. U. S. Dept. Agr. Leaflet 121L, rev., 8 p., illus. 1940.

Investigations on the physical and chemical properties of beeswax. Charles S. Bisson, George H. Vansell, and Walter B. Dye. U. S. Dept. Agr. Tech. Bul. 716T, 24 p., Illus. 1940.

Prevention of damage by the seed-corn maggot to potato seed pieces. W. J. Reid, Jr., R. C. Wright, and W. M. Peacock. U. S. Dept. Agr. Tech. Bul. 719T, 38 p., illus. 1940.

Fumigation of vetch seed for the vetch bruchid. A. C. Johnson, J. S. Pinckney, J. W. Bulger, and A. M. Phillips. U. S. Dept. Agr. Cir. 555C, 11 p. 1940.

Honey and pollen plants of the United States. Everett Oertel. U. S. Dept. Agr. Cir. 554C, 64 P., illus. 1940.

A revision of the North American aphids of the genus Myzus. Preston W. Mason. U. S. Dept. Agr. M.P. 371M, 31 p., illus. 1940.